

Optically transparent, covalently binding films with patterned conductive sites



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Medical technology and devices



- > TRL 4
- > Proof of concept

Problem

Electrophysiology researchers need cell culture platforms that support both high-quality electrical recording and optical imaging. Existing microelectrode arrays often require trade-offs between conductivity, transparency, biocompatibility and ease of biofunctionalisation.

Conventional electrode materials and fabrication methods can be expensive, difficult to customise and slow to iterate. Many transparent electrode technologies still obstruct imaging at the cell-electrode interface or lack simple methods for covalently attaching biomolecules, limiting their usefulness in disease modelling, drug discovery and fundamental biological research.

Solution

This technology provides plasma enhanced chemical vapour deposited (PECVD) films containing carbon, oxygen and optionally nitrogen, with patterned regions of differing electrical conductivity.

Conductive electrode regions are created by laser patterning, enabling flexible and potentially high-resolution electrode designs on a range of substrates. The films can be transparent, support covalent attachment or immobilisation of biomolecules and cells, and combine electrically conductive and non-conductive regions within a single coating.

This creates a versatile platform for bioelectronic devices, electrophysiology studies and advanced cell-based assays.

Intellectual Property Status

National phase filings in Australia, European Union, and United States.

Potential Commercial Applications

The technology could be applied in microelectrode arrays for neural, cardiac and other electrophysiological studies, particularly where simultaneous electrical recording and optical imaging are required.

Additional opportunities include biosensors, lab-on-a-chip devices, tissue engineering platforms, organ-on-chip systems and bioelectronic research tools.

The ability to immobilise biomolecules and cells directly on the film may support customised diagnostic devices, drug screening platforms and next-generation cell culture products.

The manufacturing approach may also enable rapid prototyping and tailored electrode designs for specialised research and industrial applications.

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